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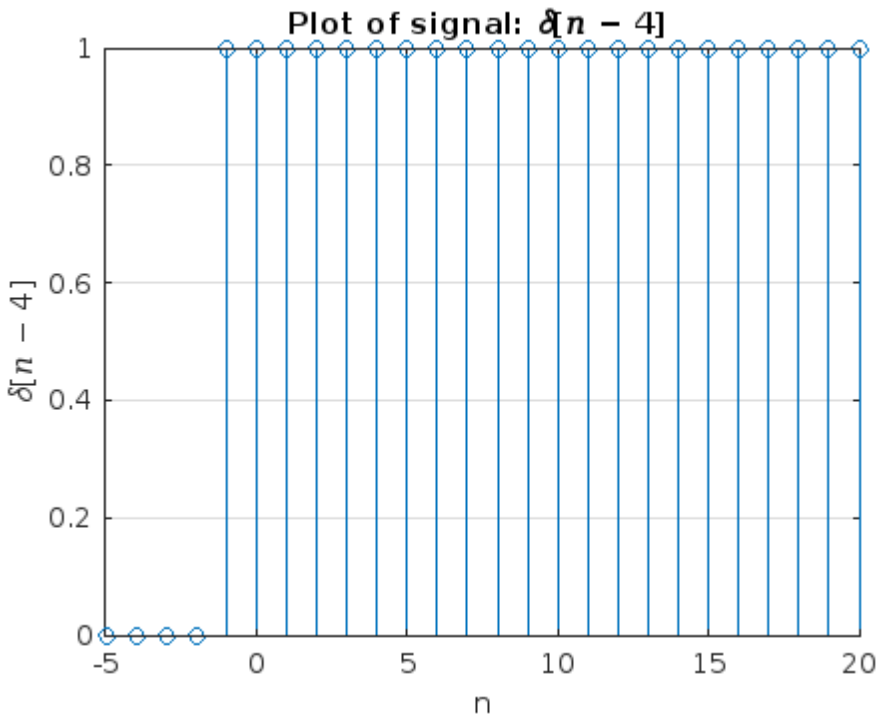
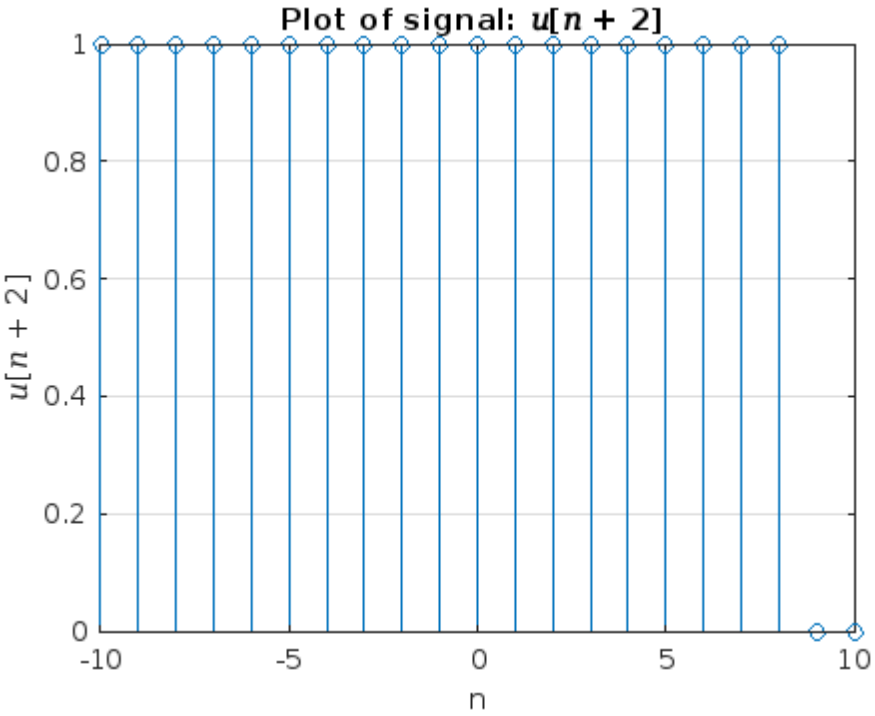
Contents

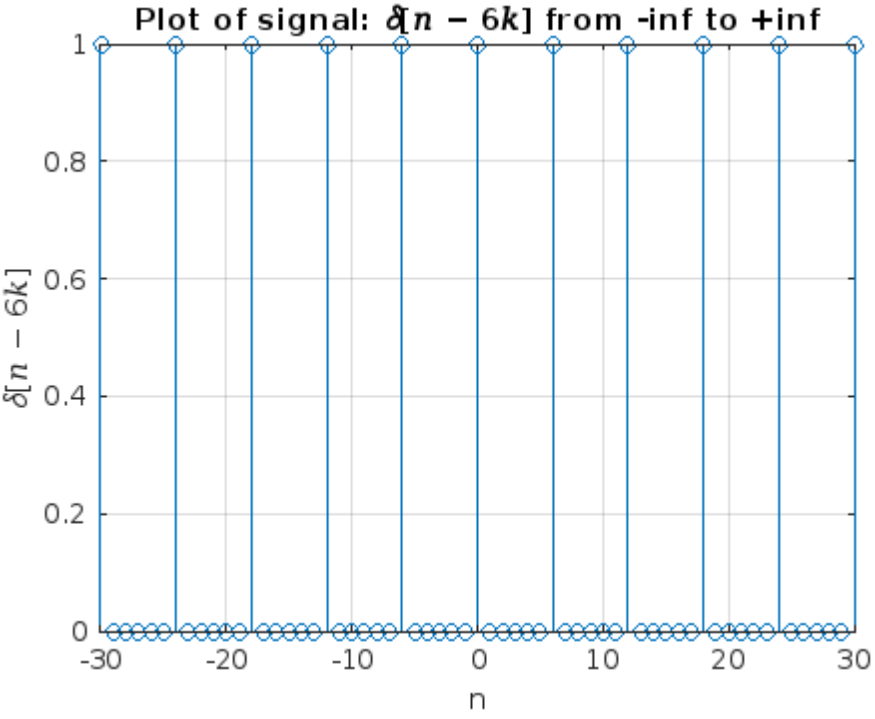
Lab Problem 1.1

```
% a.)

figure(1)
% time index n
n = -5:1:20;

% Define the signal delta[n-4]

x = zeros(1, length(n));  % Initialize a vector of zeros

n_4 = n - 4;

for i = 1:length(n)
    if n_4(i) >= -5 && n_4(i) <=20
        x(i) = 1;
    end
end

%changes the box car signal to 1 & then plots


stem(n,x)


title('Plot of signal:  [  - 4] ')

xlabel('n')
ylabel(' [  - 4]')

grid on

%b.)
figure(2)
n = -10:1:10;

% Define the signal  [  + 2]

u = zeros(1, length(n));  % Initialize a vector of zeros

n_2 = n + 2 ;

for i = 1:length(n)
    if n_2(i) >= -10 && n_2(i) <= 10
        u(i) = 1;
    end
```

```
end

stem(n,u)


title('Plot of signal:  [  + 2] ')

xlabel('n')
ylabel(' [  + 2]')

grid on

%c.)

figure(3)


nah = -30:1:30;  % range of n values

% Define the signal
delta = zeros(1, length(nah));

% Iterate over k so 6k is in range
for k = floor(min(nah)/6) : ceil(max(nah)/6)

    % Find the positions where nah equals 6k

    delta_pos = (nah == 6*k);

    if any(delta_pos)
        delta(delta_pos) = 1;  % sets delta to 1
    end
end

stem(nah, delta)

title('Plot of signal:  [  - 6 ] from -inf to +inf')
xlabel('n')
ylabel(' [  - 6 ]')
grid on
```


Plot of signal: δ[n − 4]
1
0.8
0.6
0.4
0.2
0
δ[n − 4]
-5
0
5
10
15
20
n

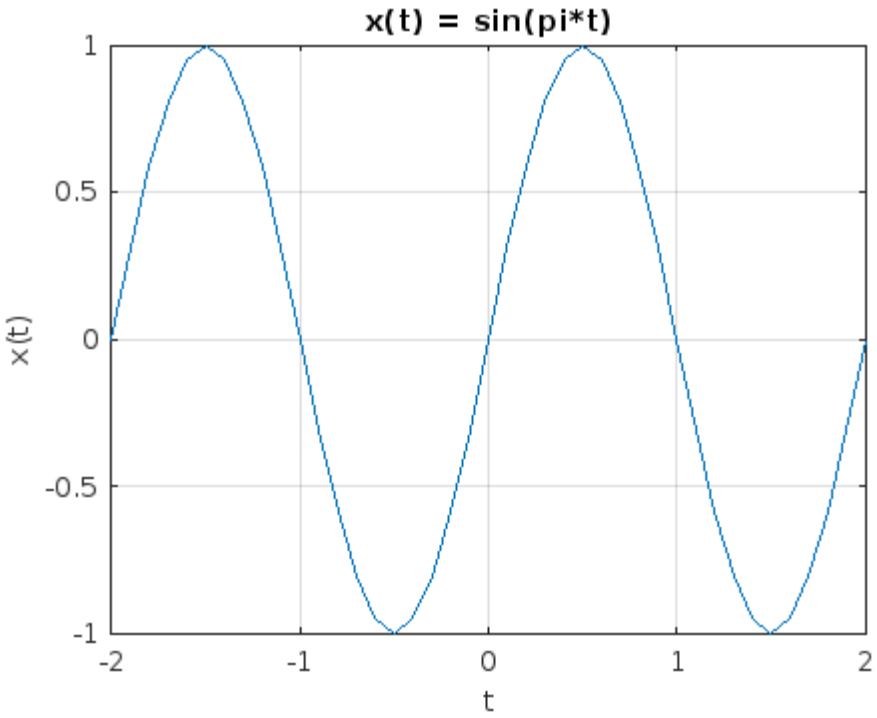


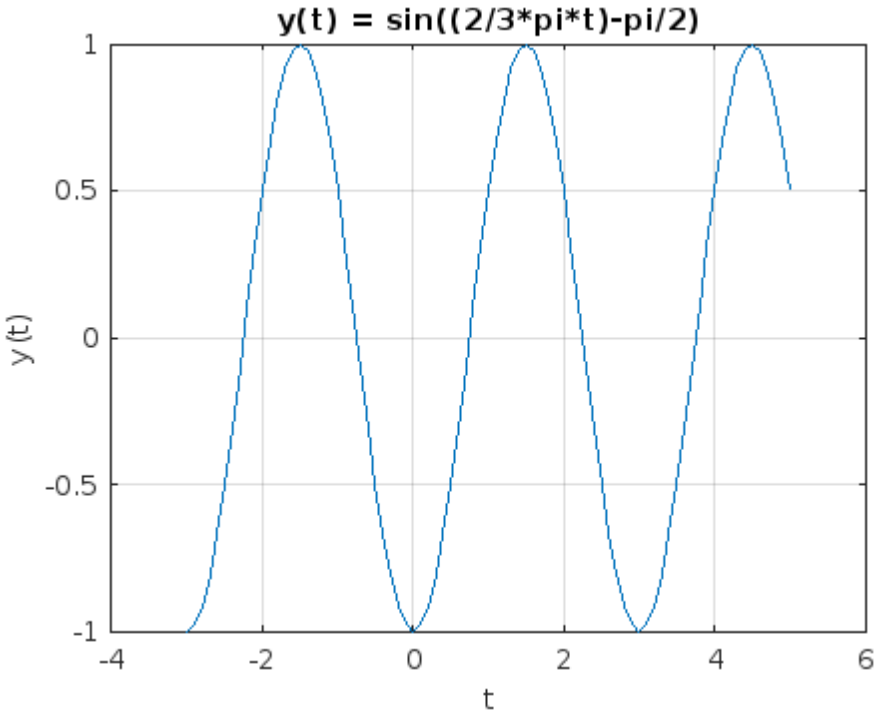


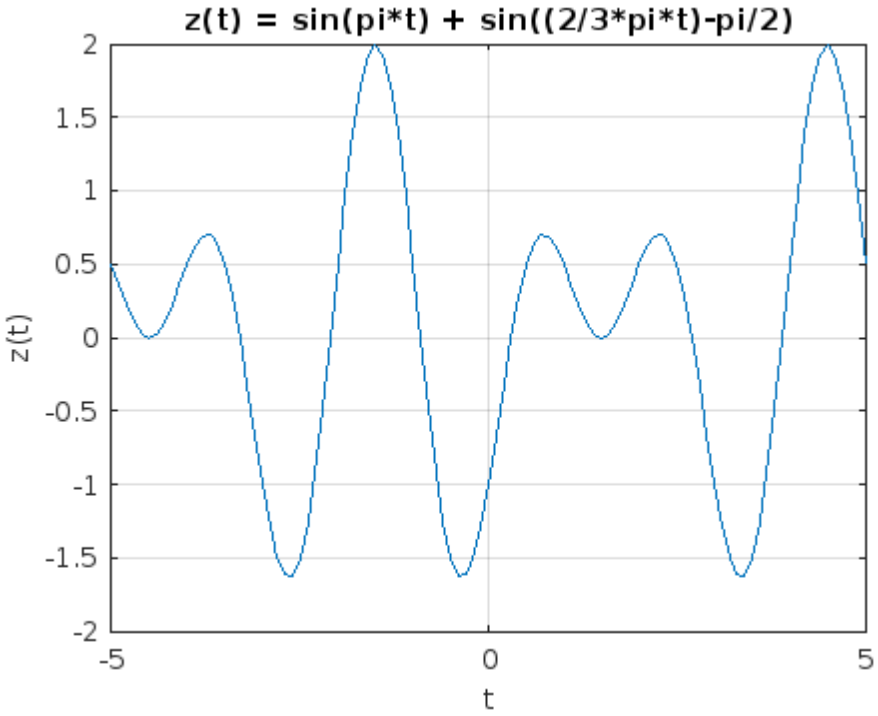
Lab Problem 1.2

```
figure(4)

t = -2:0.1:2;

x = sin(pi*t);

plot(t,x);

title("x(t) = sin(pi*t)")
```

```
xlabel('t')
ylabel('x(t)')
grid on;


%b.)

figure(5)

t = -3:0.1:5;

y = sin((2/3*pi*t)-pi/2) ;

plot(t,y);

title("y(t) = sin((2/3*pi*t)-pi/2)")
xlabel('t')
ylabel('y(t)')
grid;

%c.)

figure(6)

t = -5:0.1:5;

z = sin(pi*t) + sin((2/3*pi*t)-pi/2);

plot(t,z)
title("z(t) = sin(pi*t) + sin((2/3*pi*t)-pi/2)")
xlabel('t')
ylabel('z(t)')
grid;
```


x(t) = sin(pi*t)
x(t)
t
1
0.5
0
-0.5
-1
-2
-1
0
1
2


y(t) = sin((2/3*pi*t)-pi/2)
y(t)
t
1
0.5
0
-0.5
-1
-4
-2
0
2
4
6

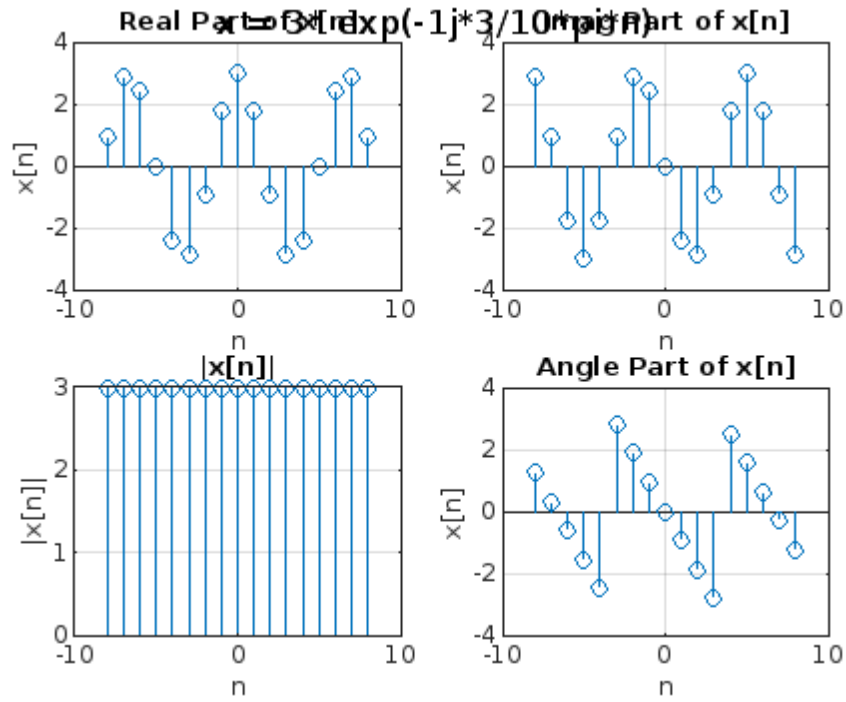


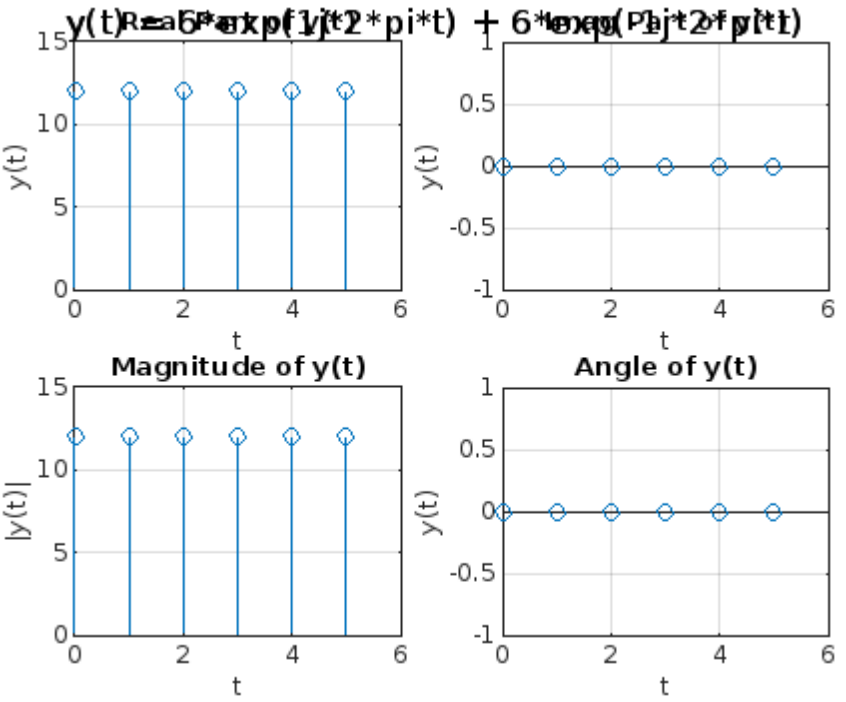
Lab Problem 1.3

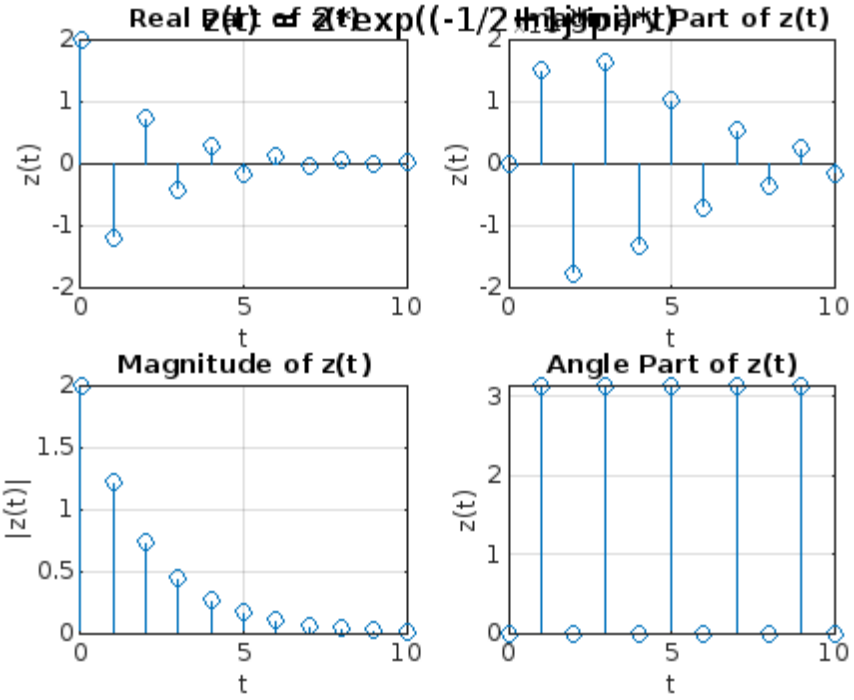
```
figure(7)

n = -8:1:8;

%equation


sgtitle('x = 3* exp(-1j*3/10*pi*n)')

x = 3* exp(-1j*3/10*pi*n);


subplot(2,2,1);
stem(n,real(x));
title("Real Part of x[n]")
xlabel("n");
ylabel("x[n]")

grid on;

subplot(2,2,2);
stem(n,imag(x));
title("Imag Part of x[n]")
xlabel("n");
ylabel("x[n]")

grid on;

subplot(2,2,3);
stem(n,abs(x));
title(" |x[n]| ")
xlabel("n");
ylabel("|x[n]|")
```

```
grid on;

subplot(2,2,4);
stem(n,angle(x));
title("Angle Part of x[n]")
xlabel("n");
ylabel("x[n]")

grid on;



%b

figure(8)

t = 0:1:5;

%equation

y = 6*exp(1j*2*pi*t) + 6*exp(-1j*2*pi*t);


subplot(2,2,1);
stem(t,real(y));
title("Real Part of y(t)")
xlabel("t");
ylabel("y(t)")

grid on;

subplot(2,2,2);
stem(t,imag(y));
title("Imag Part of y(t)")
xlabel("t");
ylabel("y(t)")

grid on;

subplot(2,2,3);
stem(t,abs(y));
title("Magnitude of y(t)")
xlabel("t");
ylabel("|y(t)|")

grid on;

subplot(2,2,4);
stem(t,angle(y));
title("Angle of y(t)")
xlabel("t");
ylabel("y(t)")
grid on;

sgtitle("y(t) = 6*exp(1j*2*pi*t) + 6*exp(-1j*2*pi*t)")
```

```
%c

figure(9)

t = 0:1:10;

%equation

z = 2*exp((-1/2+1j*pi)*t);


subplot(2,2,1);
stem(t,real(z));
title("Real Part of z(t)")
xlabel("t");
ylabel("z(t)")

grid on;

subplot(2,2,2);
stem(t,imag(z));
title("Imaginary Part of z(t)")
xlabel("t");
ylabel("z(t)")

grid on;

subplot(2,2,3);
stem(t,abs(z));
title("Magnitude of z(t)")
xlabel("t");
ylabel("|z(t)|")


grid on;

subplot(2,2,4);
stem(t,angle(z));
title("Angle Part of z(t)")
xlabel("t");
ylabel("z(t)")

grid on;


sgtitle("z(t) = 2*exp((-1/2+1j*pi)*t)")
```


x[n] = 3*exp(-1j*3/10*pi*n)
Real Part of x[n]
Imaginary Part of x[n]
|x[n]|
Angle Part of x[n]
x[n]
|x[n]|
n


y(t) = 6*exp(1j*2*pi*t) + 6*exp(-1j*2*pi*t)
Real Part of y(t)
Imaginary Part of y(t)
Magnitude of y(t)
Angle of y(t)
y(t)
|y(t)|
t



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